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Fletcher

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(54) **FIRE SUPPRESSION SYSTEM**

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(51) **Int. Cl.**

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A62C 35/13	(2006.01)
A62C 35/62	(2006.01)
A62C 35/68	(2006.01)

(52) **U.S. Cl.**
CPC ***A62C 37/11*** (2013.01); ***A62C 35/13*** (2013.01); ***A62C 35/62*** (2013.01); ***A62C 35/68*** (2013.01)

(58) **Field of Classification Search**
CPC A62C 37/04; A62C 37/11
USPC 169/16, 90, 56, 60, 61, 5, 26; 239/581.1
See application file for complete search history.

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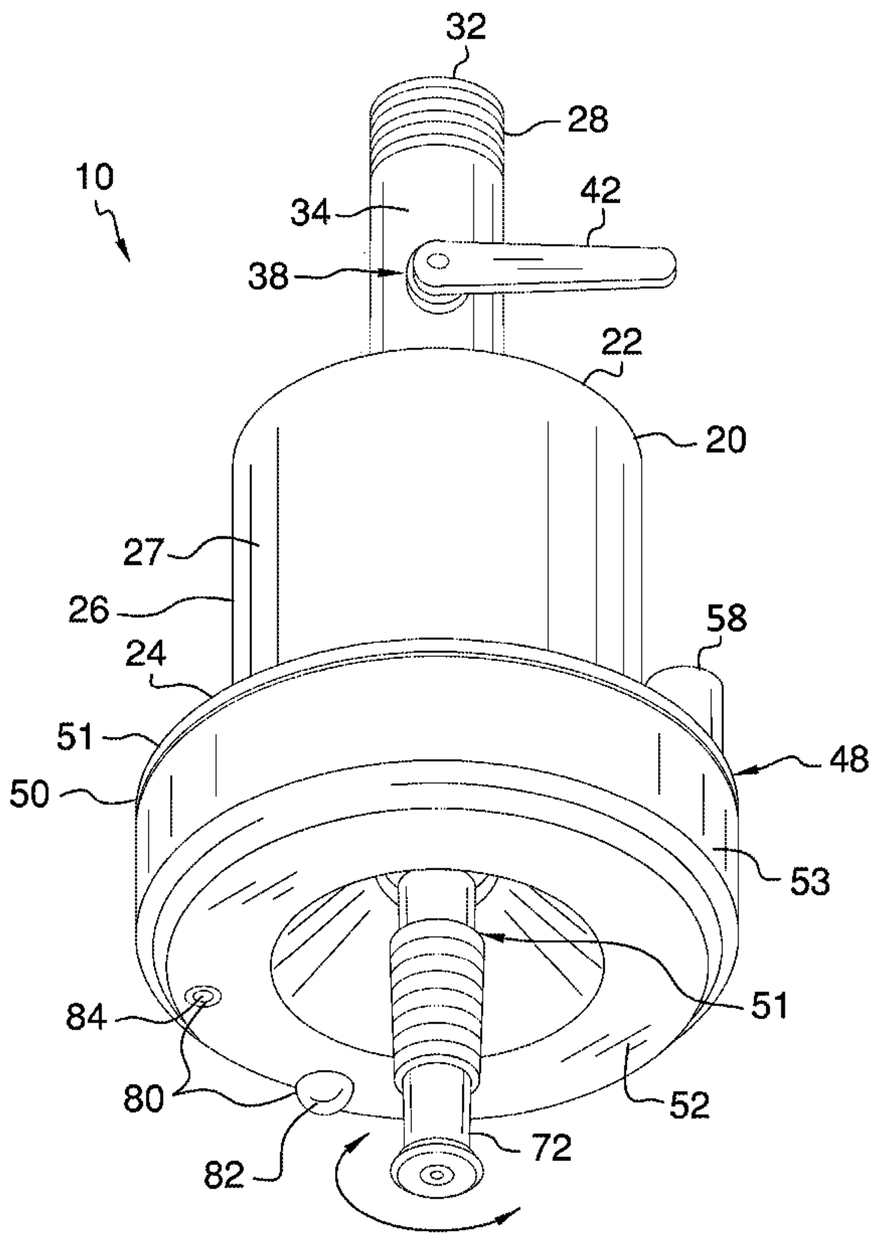
(57) **ABSTRACT**

A fire suppression system including at least one heat-sensing device attached to a CPU-controlled sprinkler, which upon detection of a heat signature, activates the sprinkler to selectively dispense water from a fire sprinkler system pipe or a fire suppressant contained within a canister from a nozzle directly aimed at the source of the heat signature.

4 Claims, 5 Drawing Sheets



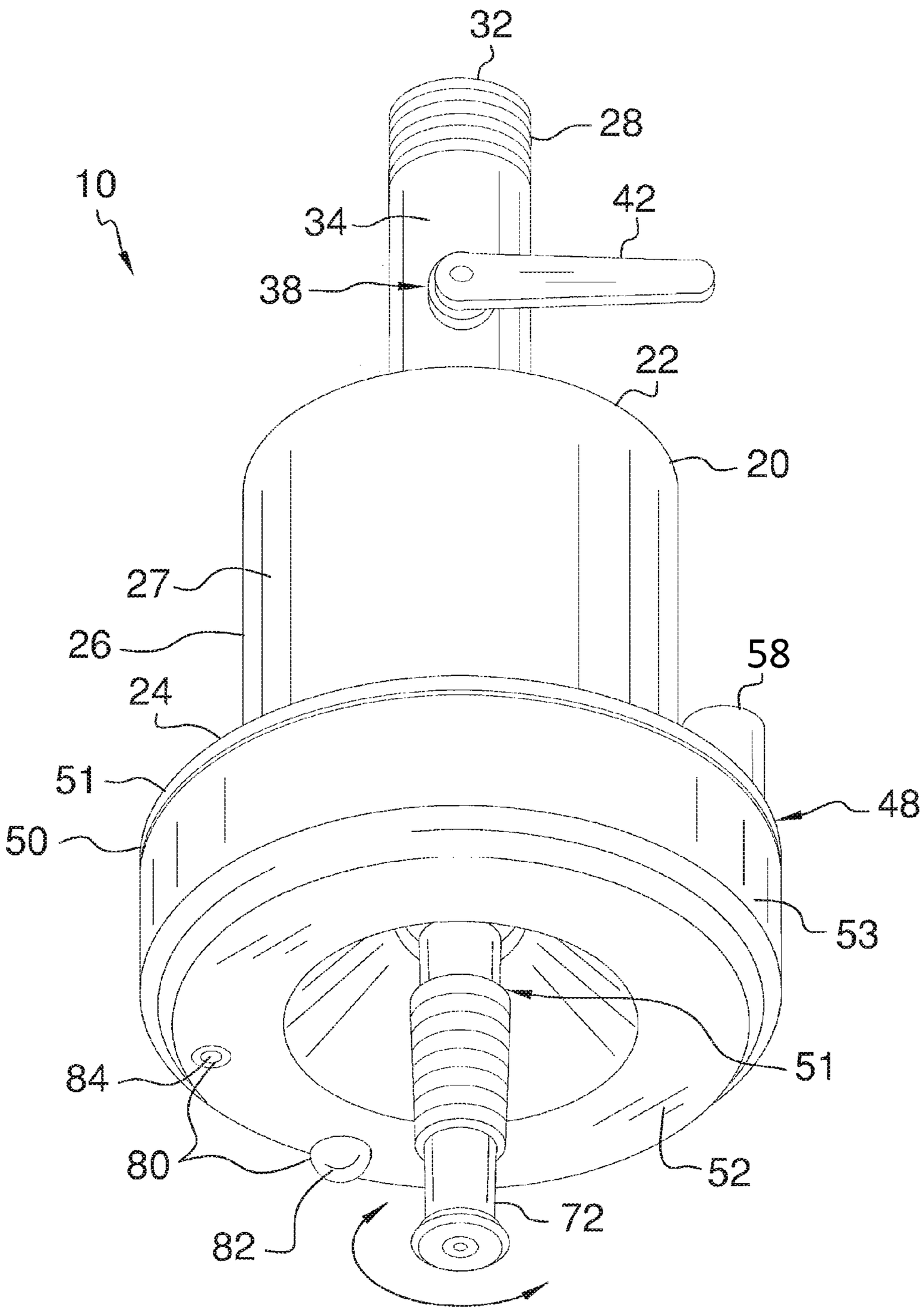
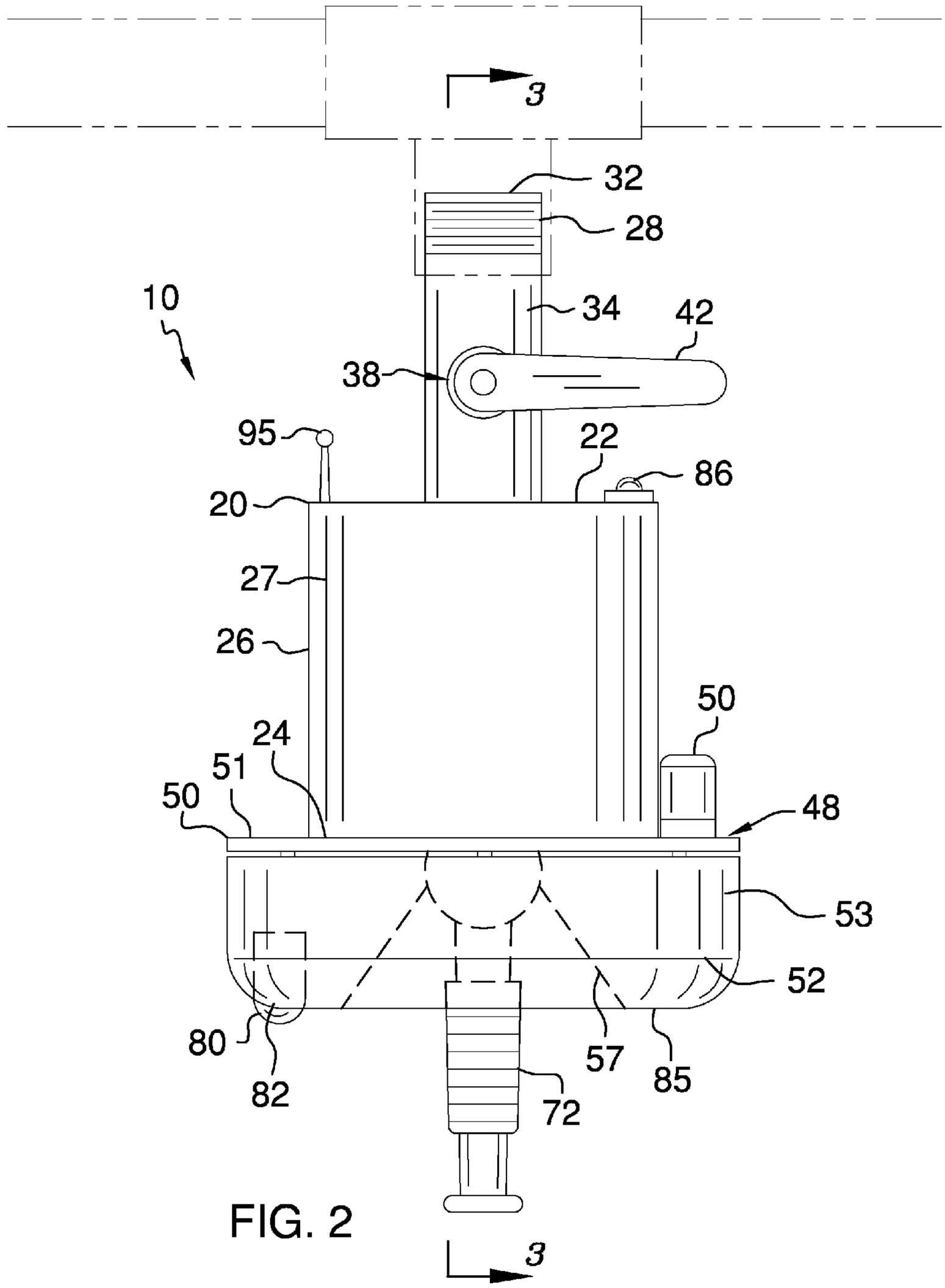


FIG. 1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42
38
95
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48
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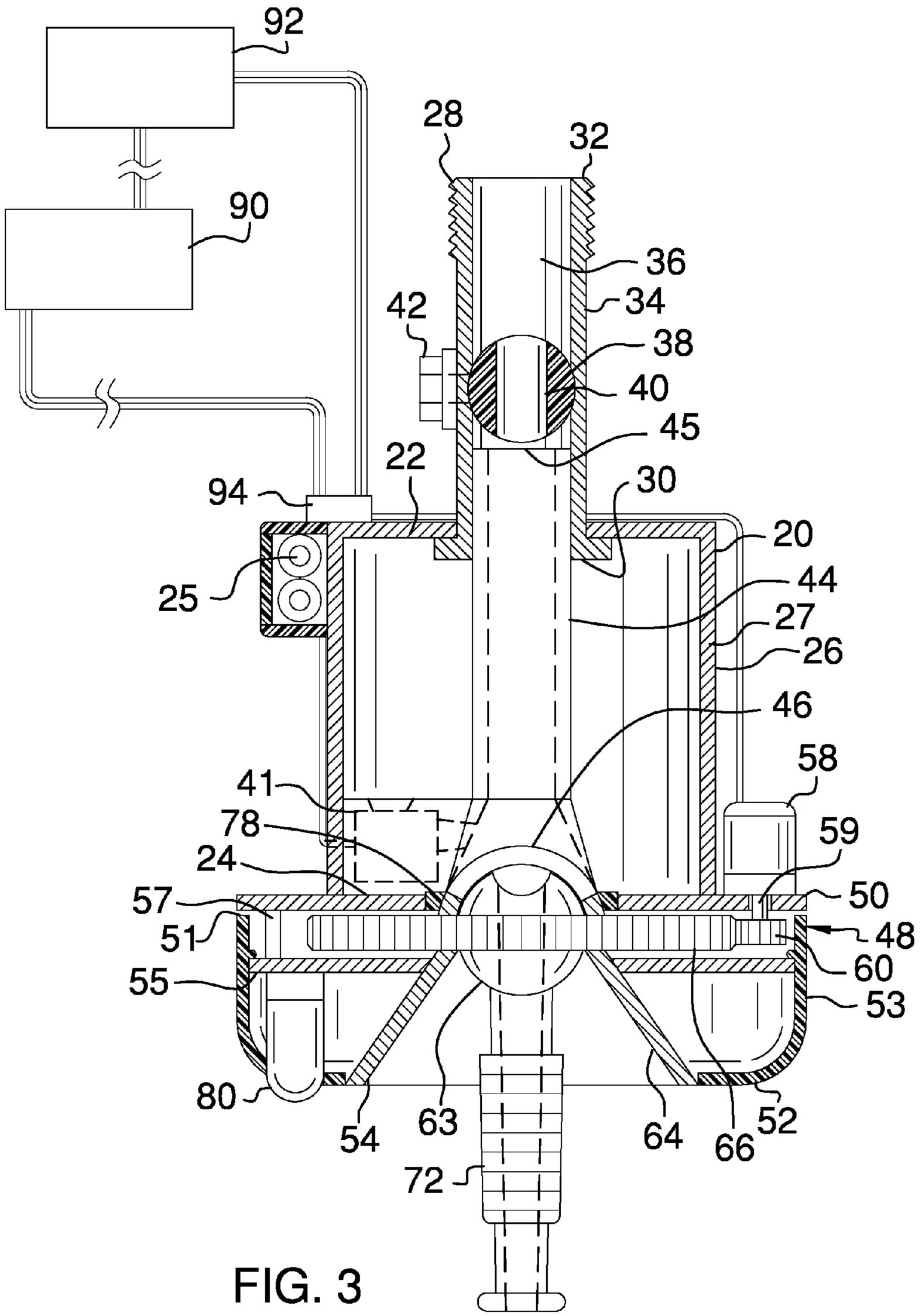
80
82
57
85
72
3

FIG. 2


92
90
28
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38
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22
94
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58
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78
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80
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66
52
72

FIG. 3

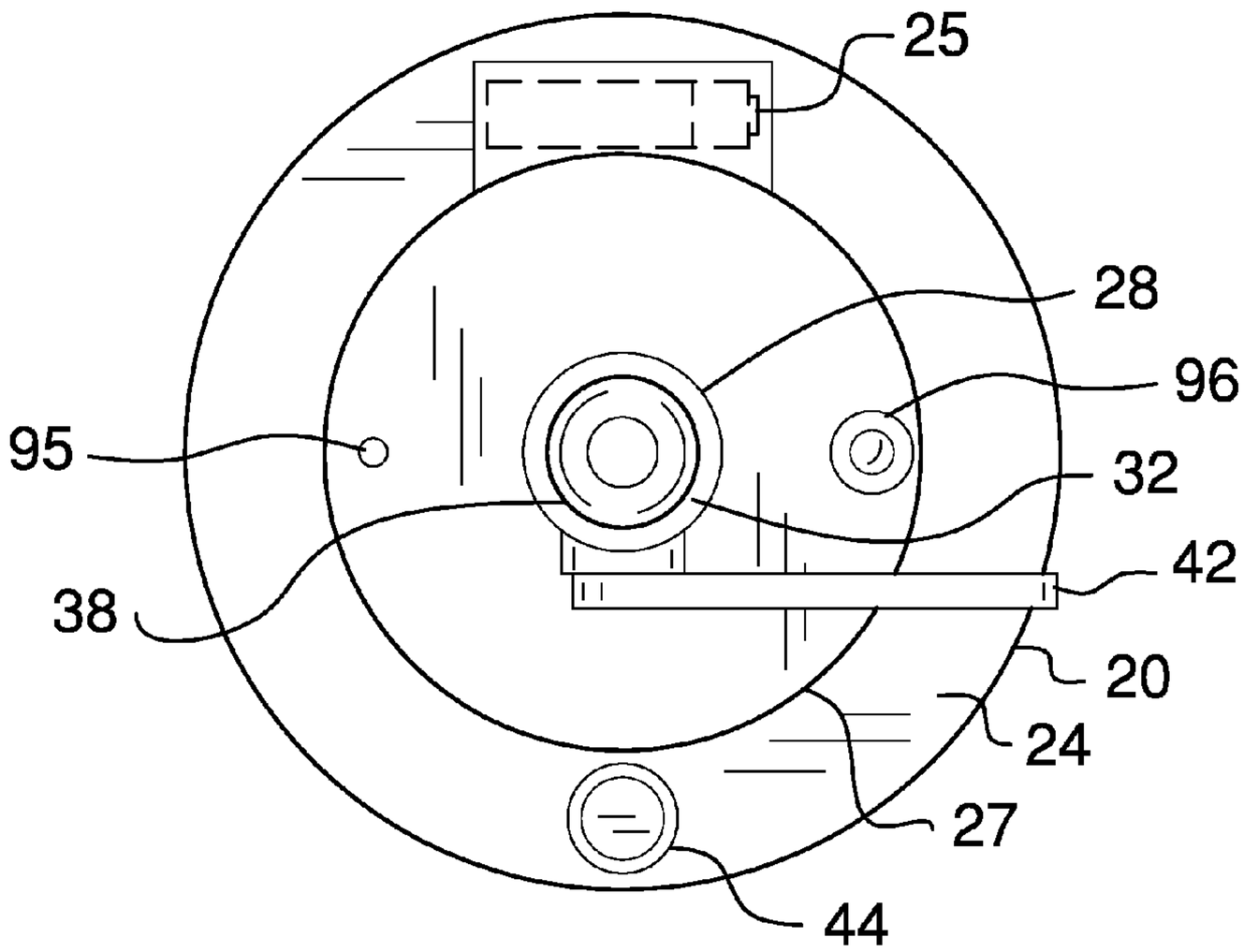

FIG. 4

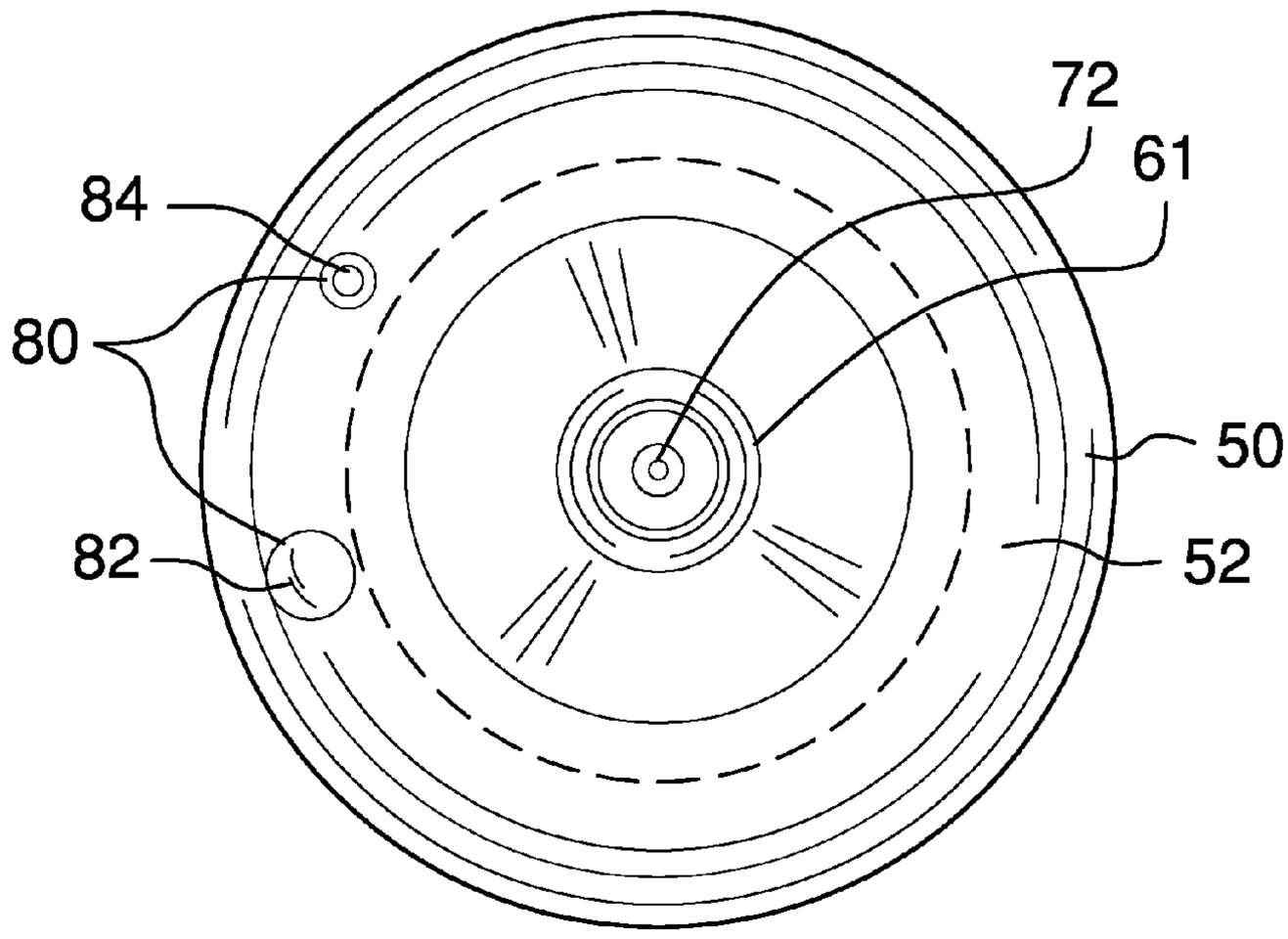

FIG. 5

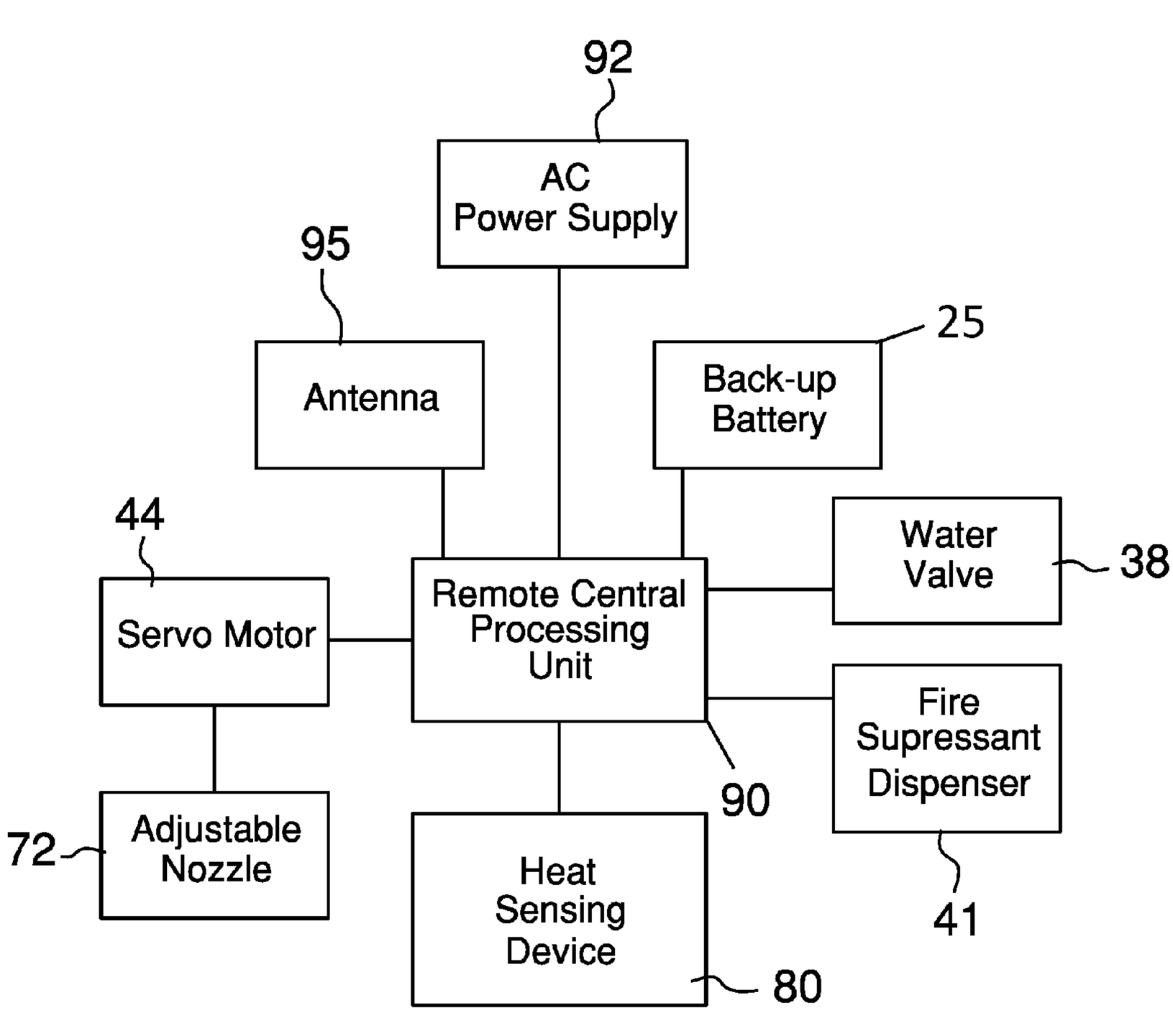
92
AC
Power Supply
95
Antenna
25
Back-up
Battery
44
Servo Motor
Remote Central
Processing
Unit
Water
Valve
38
Fire
Supressant
Dispenser
90
72
Adjustable
Nozzle
Heat
Sensing
Device
80
41

FIG. 6

FIRE SUPPRESSION SYSTEM

BACKGROUND OF THE INVENTION

Various types of fire detection and suppression systems are known in the prior art. However, what is needed is a fire suppression system providing at least one central processing unit controlled sprinkler devised to activate upon the detection of a heat signature by a heat-sensing device, such as an infrared camera and a laser tracker, disposed on the sprinkler itself and to directly target the source of the heat signature for spraying with a nozzle on the sprinkler.

FIELD OF THE INVENTION

The present invention relates to fire detection and suppression systems, and more particularly, to a fire suppression system which provides at least one heat-sensing device attached to a CPU-controlled sprinkler, which upon detection of a heat signature, activates the sprinkler to selectively dispense water from a fire sprinkler system pipe or a fire suppressant contained within a canister from a nozzle directly aimed at the source of the heat signature.

SUMMARY OF THE INVENTION

The general purpose of the present fire suppression system, described subsequently in greater detail, is to provide a fire suppression system which has many novel features that result in a fire suppression system which is not anticipated, rendered obvious, suggested, or even implied by prior art, either alone or in combination thereof.

To accomplish this, the present fire suppression system devised to extinguish a source of fire before the fire spreads by providing at least one heat-sensing device attached to a CPU-controlled sprinkler, which upon detection of a heat signature, activates the sprinkler to selectively dispense water from a fire sprinkler system pipe or a fire suppressant contained within a canister from a nozzle directly aimed at the source of the heat signature. Because each sprinkler includes a separate heat-sensing device, only the sprinklers in specific area are activated. In addition, because the nozzle is directly aimed at the fire source, damage to items stored in the area is reduced when compared to other fire sprinkler systems which either activate all sprinklers simultaneously or activate sprinkler in a specific zone, but do not directly target the source of the fire. The present device also selectively dispenses water from the fire sprinkler fire system or a fire suppressant, as necessary for the particular type of item stored in the area of each sprinkler. Depending on the pre-set temperature at which the detection of a heat signature is set, the present system is capable of extinguishing a cigarette in a specific area, rather than spraying the entire area and the items stored in the area.

Thus has been broadly outlined the more important features of the present fire suppression system so that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures

FIG. **1** is a front isometric view.

FIG. **2** is a front elevation view.

FIG. **3** is a cross-sectional view taken along line **3-3** of FIG. **2**.

FIG. **4** is a top plan view.

FIG. **5** is a bottom plan view.

FIG. **6** is a block diagram of operations.

DETAILED DESCRIPTION OF THE DRAWINGS

With reference now to the drawings, and in particular FIGS. **1** through **6** thereof, an example of the instant fire suppression system employing the principles and concepts of the present fire suppression system and generally designated by the reference number **10** will be described.

Referring to FIGS. **1** through **6** the present fire suppression system **10** is illustrated. The fire suppression system **10** includes at least one housing unit **20** having a top side **22**, a bottom side **24**, and a continuous outer wall **26** disposed between the top side **22** and the bottom side **24**. A canister **27** is continuously disposed between the outer wall **26**, the top side **22**, and the bottom side **24**. The canister **27** is configured to contain an amount of fire suppressant substance therein, such as a dry fire suppressant or a foam fire suppressant. A connection pipe **28** is provided to direct flow of water from a fire sprinkler system pipe therethrough. The connection pipe **28** has a bottom end **30**, a top end **32**, an exterior wall **34** continuously disposed between the bottom end **30** and the top end **32**, and a longitudinal channel **36** continuously disposed between the bottom end **30**, the top end. **32**, and the exterior wall **34**. The bottom end **30** is disposed within the housing unit **20** directly adjacent the top side **22**. The top end **32** is fluidly connected to a fire sprinkler system pipe.

An on-off valve **38** is disposed within the channel **36** and has a conduit **40** therethrough. A flow-controlling mechanism **41** is disposed proximal to, in fluid communication with and in operational communication with the canister **27**. A valve switch **42** is disposed on the exterior wall **34** directly adjacent the on-off valve **38**, and is in direct operational communication with the on-off valve **38**. The valve switch **42** engages the on-off valve **38** to move the on-off valve **38** from an open position with the conduit **40** being in parallel alignment with the channel **36** and to an alternate closed position with the conduit being perpendicular to channel **36**. The fire sprinkler system pipe is in fluid communication with a flow pipe **44** when the on-off valve **38** is the open position as the flow pipe **44** is in fluid communication with the connection pipe **28**. The flow pipe **44** is in alternate fluid communication with the flow-controlling mechanism **41** when the on-off valve **38** is in the closed position. The flow pipe **44** has an upper end **45** disposed within the channel **36** between the on-off valve **38** and the bottom end of the connection pipe **28**. The flow pipe **44** further has a lower end **46** disposed proximal the bottom side **24** of the housing unit **20**. A nozzle assembly **48** is disposed on the bottom side **24** of the housing unit **20**.

A nozzle housing **50** is disposed on the bottom side **24** of the housing unit **20**. The nozzle housing **50** has an upper side **51**, a lower side **52**, and an outer side **53** disposed between the upper side **51** and the lower side **52**. Each of the upper side **51** and the lower side **52** has a central opening **54**. A support bracket **55** is horizontally disposed within the nozzle housing **50** in a position parallel to the lower side **52** and proximal to the top side **51**. A connection member **57** is disposed between and attached perpendicularly to the bottom side **24** of the housing unit **20** and the support bracket **55**. A servo motor **58** is disposed on the nozzle housing **46** upper side **47** in a position opposite the connection member

57. The servo motor **58** has a positionable shaft **59** disposed through the upper side **51** of the nozzle housing **50** and a drive gear **60** disposed parallel to and proximal the upper side **51** of the nozzle housing **50**. The shaft **59** is in operational communication with the drive gear **60**. A ball and socket snap-fit joint **61** is rotatably disposed within the central opening **54** and extends between the bottom side **24** of the housing unit **20** and the lower side **52**. The ball and socket snap-fit joint **61** has a ball **63** rotatably disposed within a frustoconical socket **64**. The ball **63** is rotatable 360 degrees. A nozzle gear **66** is in direct operational communication with the drive gear **60** and the ball and socket snap-fit joint **61**. A single central adjustable nozzle **72** is longitudinally disposed through the ball **63** and has a lowermost end **76** extending outwardly from the lower side **54** of the nozzle housing **50**. The nozzle **72** is in direct fluid communication with the flow pipe **44**. The flow pipe **44** dispenses an amount of water from the fire sprinkler system pipe through the connection pipe **28** and outwardly through the nozzle **72** and alternately dispenses the fire suppressant from the dispensing mechanism **41** and outwardly through the nozzle **62** as directed by the microprocessor.

A bushing **78** is disposed on the bottom side **24** of the housing unit **20** directly adjacent the central opening **54** to permit smooth rotation of the nozzle **72** with reduced vibrations which would otherwise be present.

A heat-sensing device **80** is disposed within the nozzle housing **50** proximal the lower side **52**. The heat-sensing device **80** is configured to detect a heat signature at a pre-set temperature level. The heat-sensing device **80** is one of an infrared camera **82** and a laser tracker **84**. A remote central processing unit **90** is in wireless operational communication with the heat-sensing device **80**, the valve switch **42** and the flow-controlling mechanism **41**. Upon the detection by the heat-sensing device **80** of the heat signature at the pre-set temperature level, the central processing unit **90** activates the servo motor **58**. Upon activation of the servo motor **58**, the nozzle **72** rotates as directed by the central processing unit **90** within the ball and socket snap-fit joint **61** toward the source of the heat signature. Upon detection by the heat-sensing device **80** of the heat signature at the pre-set temperature, the central processing unit **90** further selectively activates one of the valve switch **42** and the flow-controlling mechanism **41** depending upon the particular type of item stored proximal the heat-sensing device **80**. When the valve switch **42** is activated by the central processing unit **90** and the on-off valve **38** is in the open position, the flow pipe **44** dispenses an amount of water from the fire sprinkler system pipe through the connection pipe **28** and outwardly through the nozzle **72**. When the valve switch **42** is deactivated by the central processing unit **90** and the on-off valve **38** is in the closed position, the flow-controlling mechanism **41** alternately dispenses the fire suppressant substance from the canister **27** and outwardly through the flow pipe **44** and through the nozzle **72** as directed by the central processing unit **90**.

A primary AC power source **92** is in operational communication with each of the central processing unit **90** and the servo motor **58**. A wireless antenna **95** is in operational communication with the central processing unit **90**. At least one battery **25** is disposed on the housing unit **20** to provide a back-up source of power. An automatic power source switch **94** is in operational communication with each of the at least one battery **25** and the primary AC power source **92**. The automatic power source switch **94** selectively alternates the source of power from the primary AC power source **92** to the at least one battery **25** upon the failure of the primary AC power source **92**.

A light emitting diode **96** is disposed atop the housing unit **20**. The light emitting diode **96** is in operational communication with the power source switch **94**. The light emitting diode **96** is configured to emit light when a source of power is provided through the power source switch **94** to the servo motor **58**.

What is claimed is:

1. A fire suppression system comprising:

at least one housing unit having a top side, a bottom side, and a continuous outer wall disposed between the top side and the bottom side;

a canister continuously disposed between the outer wall, the top side, and the bottom side, wherein the canister is configured to contain an amount of fire suppressant substance therein;

a connection pipe having a bottom end, a top end, an exterior wall continuously disposed between the bottom end and the top end, and a longitudinal channel continuously disposed between the bottom end, the top end, and the exterior wall, the bottom end being disposed within the housing unit directly adjacent the top side, the top end being fluidly connected to a fire sprinkler system pipe;

an on-off valve disposed within the channel, the on-off valve having a conduit therethrough;

a flow-controlling mechanism disposed proximal to, being in fluid communication with, and being in operational communication with the canister;

a valve switch disposed on the exterior wall directly adjacent the on-off valve, the valve switch in operational communication with the on-off valve, wherein the valve switch engages the on-off valve to move the on-off valve from an open position with the conduit being in parallel alignment with the channel and to an alternate closed position with the conduit being perpendicular to channel;

a flow pipe in fluid communication with the connection pipe when the on-off valve is in the open position and in alternate fluid communication with the flow-controlling mechanism when the on-off valve is in the closed position, the flow pipe having an upper end disposed within the channel between the on-off valve and the bottom end of the connection pipe, the flow pipe further having a lower end disposed proximal the bottom side of the housing unit;

wherein the fire sprinkler system pipe is in fluid communication with the flow pipe when the on-off valve is the open position;

a nozzle assembly disposed on the bottom side of the housing unit, the nozzle assembly comprising:

a nozzle housing disposed on the bottom side of the housing unit, the nozzle housing having an upper side, a lower side, and an outer side disposed between the upper side and the lower side, each of the upper side and the lower side having a central opening;

a support bracket horizontally disposed within the nozzle housing in a position parallel to the lower side and proximal to the top side;

a connection member disposed between and attached perpendicularly to the bottom side of the housing unit and the support bracket;

a servo motor disposed on the nozzle housing upper side in a position opposite the connection member,

the servo motor having a positionable shaft disposed through the upper side of the nozzle housing and a drive gear disposed parallel to and proximal the upper side of the nozzle housing, the shaft being in operational communication with the drive gear;

a ball and socket snap-fit joint rotatably disposed within the central opening and extending between the bottom side of the housing unit and the lower side, the ball and socket snap-fit joint having a ball rotatably disposed within a frustoconical socket, the ball being rotatable 360 degrees;

a nozzle gear in direct operational communication with the drive gear and the ball and socket snap-fit joint;

a single central adjustable nozzle longitudinally disposed through the ball and having a lowermost end extending outwardly from the lower side of the nozzle housing, the nozzle being in direct fluid communication with the flow pipe;

a bushing disposed on the bottom side of the housing unit directly adjacent the central opening;

a heat-sensing device disposed within the nozzle housing proximal the lower side, wherein the heat-sensing device is configured to detect a heat signature at a pre-set temperature level;

a remote central processing unit in wireless operational communication with the heat-sensing device, the valve switch and the flow-controlling mechanism, wherein upon the detection by the heat-sensing device of the heat signature at the pre-set temperature level, the central processing unit activates the servo motor, wherein upon activation of the servo motor, the nozzle rotates as directed by the central processing unit within the ball and socket snap-fit joint toward the source of the heat signature, wherein upon detection by the heat-sensing device of the heat signature at the pre-set temperature, the central processing unit further selectively activates one of the valve switch and the flow-controlling mechanism depending upon the particular type of item stored proximal the heat-sensing device;

a primary AC power source in operational communication with each of the central processing unit and the servo motor; and

a wireless antenna in operational communication with the central processing unit;

wherein when the valve switch is activated by the central processing unit and the on-off valve is in the open position, the flow pipe dispenses an amount of water from the fire sprinkler system pipe through the connection pipe and outwardly through the nozzle; and

wherein when the valve switch is deactivated by the central processing unit and the on-off valve is in the closed position, the flow-controlling mechanism alternately dispenses the fire suppressant substance from the canister and outwardly through the flow pipe and through the nozzle as directed by the central processing unit.

2. The fire suppressant system of claim **1** wherein the heat-sensing device is one of an infrared camera and a laser tracker.

3. The fire suppressant system of claim **1** further comprising:

at least one battery disposed on the housing unit; and

an automatic power source switch in operational communication with each of the at least one battery and the primary AC power source, wherein the automatic power source switch selectively alternates the source of power from the primary AC power source to the at least one battery upon the failure of the primary AC power source.

4. The fire suppressant system of claim **1** further comprising a light emitting diode disposed atop the housing unit;

wherein the light emitting diode is in operational communication with the power source switch; and

wherein the light emitting diode is configured to emit light when a source of power is provided through the power source switch to the servo motor.

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